INSTRUCTIONS:
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SUMMARY:
Updated RS-485 connection diagram for networked markers (Fig. 3-6)
Installation Manual

TMP4100-Series/400
PINSTAMP® Marking System

This manual contains installation information for the Telesis TMP4100-Series/400 Marking Systems. These systems use the TMC400 Controller and the TMP4100 hand-held pneumatic-pin marker, the TMP4100E hand-held electric-pin marker, or the TMP4150 fixture-mounted pneumatic-pin marker.

This manual may be supplemented and kept current by Change Notices and Revisions.
List of Effective Pages

DATES OF MANUAL AND CHANGED PAGES:
Original Issue....................................March 2000
Change 1 .................................... September 2000
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NOTE
The portion of the text affected by the change is indicated by a vertical line in the outer margins of the page. Changes to illustrations (other than diagrams and schematics) are identified with a miniature pointing hand. Shading is used to highlight the area of diagrams and schematics containing a change.

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Safety Summary

The TMP4100-Series/400 Marking Systems use high voltage power supplies and high pressure pneumatic supplies. Accordingly, there is some danger when working with, and near, Pinstamp® marking machines. The following safety precautions should be observed at all times.

- Eye protection may be required when working in close proximity of an operating marker.
- Ear protection may be required when working with or near an operating marker.
- Keep all body parts, jewelry, and clothing clear of the marker while it is operating.
- **TMP4100, TMP4150:** Do not disconnect the tubing while air pressure is applied to the lines.
- Do not remove or defeat the marking system’s safety features or protective guards.
- Never use the marker in any manner or for any purpose other than that for which it was designed.

Warnings, Cautions, and Notes are placed throughout this manual to alert you to important information. These messages have the following significance.

**WARNING**

Warnings contain information that is essential to the personal safety of the user.

**CAUTION**

Cautions contain information that is essential to avoid damage to the equipment.

**NOTE**

Notes call attention to information of special importance at specific points within the text.
Chapter 1
System Specifications

*** NOTICE ***

This manual documents the TMP4100, the TMP4100E, and the TMP4150 marking heads.

The TMP4100 and TMP4150 heads contain a pneumatic pin that uses air pressure to drive the pin from and return the pin to the pin cartridge. The TMP4100E uses no air pressure. The TMP4100E (electric) uses an electric solenoid to drive and an internal spring to assist pin return.

Installation of the marking heads is almost identical. Where variation do exist, they will be clearly identified within the text to inform you of the differences.

**TMP4100, TMP4100E:** The TMP4100 and TMP4100E markers are hand-held markers. They may be used in any orientation **except inverted** (that is, with the handle pointing upward).

**TMP4150:** The TMP4150 is a fixture-mounted marker for in-line use. The marking head may be mounted in any orientation **except inverted** (that is, with the mounting holes pointing upward). Typically, it should be mounted on a tooling fixture with the pin pointing downward. The TMP4150 marking head employs a protective boot to help prevent contaminants from entering the marking head cavity.

The marking system design and specifications are subject to change without prior notice.
1.1 MARKING HEAD

TMP4100:

Weight 1…………………………………… 4.08 lb. (1.85 kg) marking head with handle
5.50 lb. (2.49 kg) marking head with handle and marker cable

Dimensions (L x W x H) 2……………9.19 x 4.55 x 7.93 in. (234 x 116 x 201 mm) with 25XL pin & handle
9.44 x 4.55 x 7.93 in. (240 x 116 x 201 mm) with 150S pin & handle

X-axis Travel …………………… 2.0 in. (50.8 mm) maximum
Y-axis Travel …………………… 0.3 in. (7.6 mm) maximum

Number of Impact Pins …………. 1

Pin Type ……………………………… 25XL- or 150S-series

Pin Material……………………………Powered Metal or Carbide (25XL-series)
Powered Metal or Carbide-tipped (150S-series)

Pin Stroke: 25XL-series pin ……0.125 in. (3.1 mm) recommended; 0.5 in. (12.7 mm) maximum
150S-series pin ……0.125 in. (3.1 mm) recommended; 0.25 in. (6.4 mm) maximum

Air Consumption 3
At Idle ………………………… 0.04 SCFM maximum
While Marking …………………… 0.80 SCFM maximum

Operating Temperature …………32° to 105°F (0° to 40°C)
Humidity …………………………… 0% to 80%

TMP4100E:

Weight 1…………………………………… 4.08 lb. (1.85 kg) marking head with handle
5.50 lb. (2.49 kg) marking head with handle and marker cable

Dimensions (L x W x H) 2……………9.91 x 4.55 x 7.93 in. (252 x 116 x 201 mm) with 25XLE pin & handle

X-axis Travel …………………… 2.0 in. (50.8 mm) maximum
Y-axis Travel …………………… 0.3 in. (7.6 mm) maximum

Number of Impact Pins …………. 1

Pin Type ……………………………… 25XLE

Pin Material……………………………Carbide

Pin Stroke…………………………… 0.187 in. (4.7 mm) maximum

Operating Temperature …………32° to 105°F (0° to 40°C)
Humidity …………………………… 0% to 80%

Notes:
1) Weight listed includes 25XL carbide pin and pin cartridge.
2) Length may slightly exceed dimension listed due to bend radius of marker cable and air line (if applicable).
3) Air consumption is dependent on the type of pin being used.
TMP4150:

Weight 1 .......................................8.7 lb. (3.9 kg) marking head, brackets, and cable
Dimensions (L x W x H) 2 .................. 9.89 x 5.12 x 4.96 in. (251 x 130 x 126 mm) with 25XL pin (w/o boot*)
.............................................. 10.14 x 5.12 x 4.96 in. (258 x 130 x 126 mm) with 150S pin (w/o boot*)

* Boot dimension.........................5.33 in. (135 mm) diameter
X-axis Travel.................................2.0 in. (50.8 mm) maximum
Y-axis Travel.................................0.3 in. (7.6 mm) maximum
Number of Impact Pins..................1
Pin Type .....................................25XL- or 150S-series
Pin Material.................................Powered Metal or Carbide (25XL-series)
.............................................. Powered Metal or Carbide-tipped (150S-series)
Pin Stroke: 25XL-series pin.......0.125 in. (3.1 mm) recommended; 0.5 in. (12.7 mm) maximum
150S-series pin........0.125 in. (3.1 mm) recommended; 0.25 in. (6.4 mm) maximum

Air Consumption 3
At Idle ...................................0.04 SCFM maximum
While Marking ........................0.80 SCFM maximum
Operating Temperature..................32° to 105°F (0° to 40°C)
Humidity.................................0% to 80%

Notes:
1) Weight listed includes 25XL carbide pin and pin cartridge; weight does not include any support tooling.
2) Dimensions without marker cable or air line.
   Length may slightly exceed dimension listed due to bend radius of marker cable and air line (if applicable).
3) Air consumption is dependent on the type of pin being used.

1.2 FILTER/REGULATOR UNIT
TMP4100E. The TMP4100E does not employ a filter/regulator unit. It uses an electric solenoid to drive the pin and an internal spring to assist pin return.

TMP4100. The filter/regulator unit includes a regulator with a coarse filter and a pressure gauge to control the drive air. The unit also includes a coalescing filter to remove finer particles. The drive air fires the pin from the cartridge.

TMP4150. The filter/regulator unit includes two regulators with pressure gauges to control the drive air and return air. The first regulator contains a coarse filter. The unit also includes a coalescing filter to remove finer particles. The drive air fires the pin from the cartridge. The return air pushes the pin back into the cartridge.

Temperature ......................... 32° to 125°F (0° to 25°C)
Operating Pressure .................. 120 psi (8.3 bars) maximum
1.3  CONTROLLER

Rating.....................................NEMA 1 (I.P. 30)
Dimensions (H x W x D) .............3.60 x 18.33 x 9.01 in. (91.4 x 465.6 x 228.9 mm)
Weight ...................................9.5 lb. (4.32 kg)
Operating Temperature............32° to 105°F (0° to 40°C), non-condensing
Humidity .................................10% to 80%
Shock .....................................30G/4ms half sine-wave (operating)
                                  75G/11ms half sine-wave (non-operating)
Vibration..............................0.67G (5-500 Hz) random RMS (operating)
                                  1.04G (2-200 Hz) random RMS (non-operating)
Power Requirements...............95 to 250 VAC, 2 amps, 50-60 Hz, single phase
Keyboard ..............................Integrated with four line, liquid crystal display (LCD)
I/O Voltage ............................12 to 24 VDC (customer-supplied)
Serial Communications..........RS-232 (or RS-485 in a multi-drop network)

1.4  STORAGE AND HANDLING REQUIREMENTS

Do not drop the containers.
Shock .....................................75G/11ms half sine-wave
Vibration..............................1.04G (2-200 Hz) random RMS

Store all containers in a dry, heated, non-condensing environment.
Temperature.........................-4° to 113°F (-20° to 45°C)
Humidity ...............................5% to 95%

Store all containers away from splashing or sprayed moisture.
Chapter 2
Installation Instructions

2.1 UNPACKING THE SYSTEM
This section provides guidelines for receiving and unpacking the TMP4100-Series/400 Marking Systems.

**CAUTION**
If your system arrives during cold weather, allow the components to warm up for several hours before opening the containers. Exposing the system components to room temperatures may cause condensation in the units.

When your marking system arrives, check the shipping cartons for damaged corners, holes through the cardboard, or any other signs of damage. Ask the delivery service to note any damage to the containers on the delivery receipt. Save all packing materials in case you need to return any components.

2.1.1 Accounting For Equipment
Check the materials against the packing list for your system. Note any discrepancies to your delivery service and request that they note the discrepancies on the delivery receipt. The marking system consists of:

- **TMP4100,TMP4100E**: Marking Head with pre-attached pistol-grip handle
- **TMP4150**: Marking Head with mounting plate.
- Marker Cable (pre-wired to head)
- Controller
- **TMP4100,TMP4150**: Filter/Regulator Unit
- **TMP4100,TMP4150**: Air Line(s)
- Controller Power Cable †
- Connector Kit (spare fuses, mating I/O connectors & connector pins)
- **TMP4100-Series/400 Operator’s Manual**
- **TMP4100-Series/400 Installation Manual**
- **TMP4100-Series/400 Maintenance Manual**

† 115 VAC, 60 Hz versions terminated; all others not terminated

Additional equipment may be included with the marking system. Installation information for any optional or custom equipment may be provided in a Supplement or an Addendum to this manual.
Installation Instructions

2.1.2 Inspecting for Damage
Place the components on a table and inspect each one for damage. Report any damage to your delivery service immediately.

1. Inspect the controller.
   - Ensure the controller case is not cracked or otherwise damaged.
   - Ensure the LCD display is not cracked, scratched, or damaged.
   - Ensure the connector and connector pins (on the back of the controller) are not bent or broken.

2. Inspect the marking head.
   - Ensure the marking head is not dented or cracked.
   - **TMP4100, TMP4100E**: Visually inspect the interior of the marking head for loose, disconnected, or broken components.
   - **TMP4100, TMP4100E**: Visually inspect the front of the marking head for any debris that may restrict movement.
   - **TMP4100, TMP4100E**: Inspect the pistol-grip handle and push-button for cracks and damage.
   - **TMP4150**: Inspect the protective boot for tears, cuts, or damage and for security of attachment.

3. Inspect the impact pin and pin cartridge.
   - Ensure the impact pin is not bent or broken.
   - Ensure the pin cartridge is not cracked or broken.

4. Inspect the cable assemblies.
   - Ensure the connectors are securely attached.
   - Ensure the connectors are not damaged and the connector pins are not bent or broken.
   - Ensure the electrical cables are not cut, frayed, or damaged.

5. Inspect the filter/regulator unit.
   - **TMP4100, TMP4150**: Ensure the fitting threads are not damaged.
   - **TMP4100, TMP4150**: Ensure the pressure gauge(s) and bowls are not cracked.

6. Inspect the air line(s).
   - **TMP4100, TMP4150**: Ensure the air line(s) are not kinked, cracked, or damaged.
2.2 INSTALLATION REQUIREMENTS

TMP4100, TMP4100E: These marking systems are to be used as hand-held markers.

TMP4150: This marking system is to be mounted on a tooling fixture. If the system is to be incorporated into a machine or mounted on a tool stand, safeguards must be designed and implemented at the time of the installation with the other machinery.

Refer to the drawings in Chapter 4 for installation details. If the system includes optional or custom equipment, refer to the Supplement or custom Addendum in this manual for specific information.

The following items are required for proper installation of the marking system. It is the responsibility of the installing agency to ensure these requirements are implemented.

2.2.1 General

- A dedicated, 10-amp, conditioned-power, branch circuit must be provided for the marking system.
- Systems that will use 230 VAC require a controller power cable that matches the source power outlet; the cable must be supplied by the customer.
- Power for remote I/O signals must be from 12 to 24 VDC and must be supplied by the customer.
- Data cables to connect the controller to a host or an I/O controller must be supplied by the customer. Refer to Chapter 3 for details.
- TMP4150: A safety guard may be required to keep operators away from the moving marking head and impact pin.
- TMP4150: A part-present switch may be installed to allow a START PRINT only when a part is in marking position.
- Operators may need hearing protection depending on distance from the marker and the part to be marked.
- Operators may need eye protection while operating the marker.

2.2.2 Environmental Considerations

- TMP4100, TMP4100E: The system should not be exposed to sprays, solvents, chemicals, or other contaminants.
- TMP4150: The system may be exposed to light sprays, solvents, chemicals, or other contaminants.
- Do not operate the system in an area where flammable mists or fumes are present.
- Certain chemicals may damage the exposed portion of the cartridge.
- The controller should not be exposed to any mists, sprays, solvents, oils, dust, or other contaminants.
- Allow enough space around the controller to permit adequate ventilation and to facilitate access to the rear panel for electrical connections. A minimum H x W x D envelope of 5 x 22.33 x 15 in. [127 x 567 x 381 mm] should be sufficient.
- Do not block the vents on the sides of the controller.

2.2.3 Marking Head

- The marking head should be visible from the controller.
- TMP4150: Provisions should be made to allow vertical adjustments to the marking head, allowing the marker to be positioned closer to and further away from the part being marked.
- TMP4150: Provisions should be made to allow horizontal and lateral adjustments to the marking head, allowing the marker to be positioned along both the X-axis and the Y-axis.
- The part to be marked must be solidly fixed into position.
- The marker must be solidly secured (or held) and must not move in relation to the part while marking.
2.2.4 Controller

- The controller should be installed within 13 ft. (4 m) of the marking head; 50 ft. (15 m) maximum.
- An electrical lockout switch must be installed if the controller is not visible from the marking head.
- An emergency stop (E-STOP) switch must be installed if the controller cannot be easily reached from the marking head. The switch must interrupt inlet power to the controller.

2.2.5 Filter/Regulator Unit

**TMP4100E:** The TMP4100E does not use air pressure to drive the marking pin. The following section does not apply to the TMP4100E marker.

**TMP4100, TMP4150:** The filter/regulator unit inlet receives air pressure from the plant air source. The drive air outlet supplies air pressure to the marker to drive the marking pin out of the pin cartridge for marking. Return air pressure retracts, and holds, the pin in the cartridge. For TMP4100 markers, the marking head contains an internal regulator to control the return air. For TMP4150 markers, the return air is controlled by a separate regulator on the filter/regulator unit.

- The filter unit should be installed within 13 ft. (4 m) of the marking head; 50 ft. (15 m) maximum.
- A pneumatic lockout valve (supplied by the customer) should be installed upstream of the filter unit.
- A pressure relief valve (supplied by the customer) should be installed upstream of the filter unit.
- The pressure relief valve must be set to a maximum pressure of 120 psi (8.2 bars).
- Do not connect the filter unit to air systems where compressors are lubricated with fire resistant fluids such as phosphate ester and di-ester types.
- If the supply air is extremely dirty, additional customer-supplied filters may be needed upstream of the filter unit.
- The filter unit must be located to allow servicing and draining without damaging other equipment.
- Do not install the filter unit in an area subject to direct sunlight, impact blows, or extreme temperatures.
- Do not install the filter unit where it will be exposed to aldehydes, keytones, alcohol, or hot water.
- Install the regulator so the air flows in the direction of the arrow on the body of the filter unit.
- The filter unit bowls must be mounted vertically with the bowl drains at the bottom to permit draining.
- Each port of the filter unit must be plumbed (e.g., pressure gauge, line fitting, socket pipe plug).
- The customer-furnished supply line to the filter unit should be 1/2-inch (13 mm) inside diameter.
- The filter unit requires a 1/4-inch NPT supply air inlet fitting (supplied by customer).
- Apply a minimal amount of pipe joint compound to the male threads (only) to seal the pipe joints.
- Do not use Teflon® tape to seal the pipe joints. Do not apply pipe joint compound to female threads.
2.2.6 Facility (Supply) Air

**TMP4100E:** The TMP4100E does not use air pressure to drive the marking pin. The following section does not apply to the TMP4100E marker.

**TMP4100, TMP4150:** The marking head requires a clean, dry air supply to drive the impact pin. In most cases, plant air is acceptable. The following guidelines should help you decide if your air supply is suitable for use with the marker.

**Condensation.** The process of compressing air creates heat. The compressed air cools as it travels through the lines away from the compressor. The cooling process causes any moisture in the air to condense. Condensation is common in hot climates or when air lines are routed outside during cold weather. Condensation creates problems in the air valves and small openings within the marking head. Because you can never remove all the contaminants from an air line, a filtering system should be installed as close to the marker as possible. This reduces the opportunity for moisture in the supply air to condense.

**Filtering.** The least expensive way to filter the air is to use a coalescing filter. This type of filter causes a *cyclone effect*. Swirling air and the resulting centrifugal force throws the oil and moisture particles to the outside. There it condenses on a wall and runs down to the bottom of the bowl in the less turbulent, quiet area. The coalescing filter removes solid particles (down to 0.3 microns). If the collection of contaminants becomes too great, particles can be picked up and placed in suspension in the air. Therefore, Telesis recommends an automatic drain on the coalescing filter. In addition to aerosol particles, the air may contain dust, dirt, and metal shavings. If the air is very dirty, a pre-filter can be used to remove the larger (5 micron) particulate matter.

**Air Flow.** The cyclone effect (see above) cannot occur if there is little or no flow of air. Telesis markers use much less air at idle than when marking. So it’s during the idle time that the aerosol particles have a chance to cool and condense on the walls of the cartridge and pin. Most filter manufactures recommend a minimum air flow of 20% of the maximum rated flow for their equipment to be effective. This is not a problem during marking because the rate of air consumption is relatively high. A controlled orifice opening (open to the air) can be constructed to keep the flow during idle at or above 20% of the flow rate. The controlled orifice should be located as close as possible to the marking head.

**Plumbing Factors.** Another practice for obtaining clean, dry air is to ensure the equipment is not at the end of the air line. Plumb the air supply to go up (vertically) off the main air supply line, then down to the top of a tee. The stem of the tee should be horizontal and go to the marker. The bottom of the tee should be a short stub with a drain valve or drip leg.
Parameters. The following parameters are easily achievable with a pre-filter and most coalescing filters.

- Humidity non-condensing
- 99.97% of the sub-micron particles removed
- 0.75 micron largest aerosol particle
- 0.30 micron largest solid particle
- 40° to 120°F (4.4° to 48.9°C)
- 5 micron pre-filter with an auto drain.

Practices. Follow these practices when installing and operating the marker to improve the quality of the air and increase the reliability of your marking system.

- Install the filter as close as possible to the marking head, never more than 50 ft. (15 m)
- Use Polyflo™ tubing downstream of filter with brass or plated fittings
- Use copper, brass or stainless tubing upstream of the filter
- Do not use iron pipe or iron fittings.
- Do not use Teflon® tape
- Liquid Teflon® is permissible except:
  - on polycarbonate plastic threaded holes
  - on the first thread of male fittings
- Blow down the air system after installation and before use (at least two minutes at full flow).
- Use a top tap off the main line with a drip leg (see Plumbing Factors).
- Do not use polycarbonate bowls (they will crack when used with synthetic oils).
- Always use the largest available feed line and the shortest available run.
2.3 INSTALLATION PROCEDURES
Perform the following procedures (in the order listed) to install the marking system components.

NOTE
It is the responsibility of the installing agency to ensure the installation requirements (listed in Section 2.2) are correctly implemented.

2.3.1 Filter/Regulator Unit Installation
TMP4100E: The TMP4100E does not use air pressure to drive the marking pin. The following section does not apply to the TMP4100E marker.

TMP4100, TMP4150: Refer to the Original Equipment Manufacturer (OEM) drawing for filter/regulator unit mounting details.

NOTE
The filter/regulator unit should be mounted within 13 ft. (4 m) of the marker location.

1. Rotate the drive air pressure adjustment knob fully counter-clockwise.
2. Install a supply inlet fitting in the left-side of the filter/regulator unit.
3. Mount the filter/regulator unit vertically to a solid, stable surface.
4. Secure the filter/regulator unit using four, #8 fasteners.
5. Ensure the supply air is shut off upstream of the filter/regulator unit.
6. Connect the supply air line to the filter/regulator unit inlet fitting.

WARNING
DO NOT apply inlet (supply) air pressure to the filter/regulator unit at this time.
2.3.2 Controller Installation

The controller should be mounted within 13 ft. (4 m) of the marker location. Refer to Chapter 4 for installation drawings and details.

**NOTE**

A controller power cable is provided for systems using 115 VAC 60 Hz power. For all other systems, the customer must supply an appropriate power cable.

**For 230 VAC systems only**

Obtain a power supply cable that matches the power outlet configuration.

**For all systems**

1. **Confirm the controller fuse arrangement is correctly configured for your facility’s supply power.**
   The power entry module on the back panel of the controller may be configured for a line voltage of either 115 VAC or 230 VAC. Systems using 115 VAC power require one fuse. Systems using 230 VAC require two fuses since both sides of the incoming voltage are not at ground potential. Refer to the *TMP4100-Series/400 Operator’s Manual* for Controller Inlet Fuse information.

2. Place the controller on a solid base, away from moisture and dust.

3. Ensure the controller has appropriate clearance for proper ventilation.
   Refer to the installation drawings in Chapter 4 for details.

4. Connect the power supply cord to the power entry module the back panel of the controller.
2.3.3 Marking Head Installation

TMP4100:

♦ Connect the drive air (black) tubing from the drive air fitting on marking head to the filter/regulated unit.

Note: The drive air fitting on the TMP4100 filter/regulated unit is the elbow fitting at the right side of the unit.

TMP4100E:

♦ Proceed to Electrical and Data Connections.

TMP4150: (using Telesis Tool Stand P/N 27200)

Note: Mounting hardware for the marking head is supplied in the standard tool stand kit (26208).

1. Locate the two threaded holes in the mounting plate attached to the marker.
2. Align these holes with the lowest two holes on the tool stand carriage.
3. Using two ½-13x1.25-in. hex head bolts (15294) and two ½-in. AN960-816 flat washers (11445), mount the marker to the tool stand carriage. (Bolts insert from behind the carriage.) Tighten securely.
4. Connect the drive air (black) tubing from the drive air fitting on marking head to the filter/regulated unit.

Note: The drive air fitting on the marking head is marked “D”. The drive air fitting on the TMP4150 filter/regulated unit is the tee fitting between the coalescing filter and the regulator.

5. Connect the return air (natural) tubing from return air fitting on marking head to the filter/regulated unit.

Note: The return air fitting on the marking head is marked “R”. The return air fitting on the TMP4150 filter/regulated unit is the elbow fitting at the right side of the unit.

TMP4150: (using a customer-supplied fixture)

Refer to Chapter 4 for installation drawings showing mounting hole dimensions and locations.

Note: Mounting hardware for customer-supplied fixtures is not provided.

1. Locate the four through holes near the corners of the mounting plate attached to the marker.
2. Using four ¼-in. (or 6mm) bolts, four flat washers, four lock washers, and four hex nuts, attach the marker to the fixture. Tighten securely.
3. Connect the drive air (black) tubing from the drive air fitting on marking head to the filter/regulated unit.

Note: The drive air fitting on the marking head is marked “D”. The drive air fitting on the filter/regulated unit is the tee fitting between the coalescing filter and the regulator.

4. Connect the return air (natural) tubing from return air fitting on marking head to the filter/regulated unit.

Note: The return air fitting on the marking head is marked “R”. The return air fitting on the filter/regulated unit is the elbow fitting at the right side of the unit.
2.3.4 Electrical and Data Connections

**CAUTION**

The controller is shipped with electrostatic covers installed on the rear panel connectors. Leave the covers installed on those connectors that will not be used. This will help to prevent electrostatic discharge (ESD) problems.

- For systems using a host computer interface:
  1. Fabricate an appropriate data cable for the host interface. Shielded back shells should be used to limit electromagnetic interference (EMI). A mating DB25S connector must be supplied by the customer. Refer to Chapter 3 for connection details.
  2. Ensure the host computer is OFF.
  3. Connect the data cable (customer-supplied) from the host computer to the HOST connector on the back panel of the controller.

- For systems using a remote I/O interface:
  1. Fabricate an appropriate data cable for the I/O interface. Use shielded cable and terminate the shield to the back shell *at one end only*. A mating connector is provided in the connector kit supplied with the system. Refer to Chapter 3 for connection details.
  2. Ensure the remote I/O source is OFF.
  3. Connect the data cable (customer-supplied) from the remote I/O controller to the I/O connector on the back panel of the controller.
• For systems using a remote TTL I/O interface:
  1. Fabricate an appropriate data cable for the TTL I/O interface. Use shielded cable and terminate
     the shield to the back shell at one end only. A mating connector is provided in the connector kit
     supplied with the system. Refer to Chapter 3 for connection details.
  2. Ensure the remote I/O source is OFF.
  3. Connect the data cable (customer-supplied) from the remote device to the TTL I/O connector on
     the back panel of the controller.

  **CAUTION**

  Ensure the controller power switch is OFF before connecting or disconnecting the marker cable. The controller may be damaged if the cable is connected or disconnected with power on.

• For all systems:
  1. Ensure the power entry module switch (on the back panel of the controller) is OFF.
  2. Connect the marker cable from the marking head to the MARKER connector on the back panel of
     the controller.
  3. Connect the controller power cable to the power entry module and plug in to the facility power
     outlet.
  4. When installation is complete, proceed with the following *System Adjustments.*
2.4 SYSTEM ADJUSTMENTS
After the system is installed, you will need to adjust the marking system to prepare it for use. Refer to the TMP4100-Series/400 Operator’s Manual for complete instructions on operating and adjusting the marking system.

1. Position the power entry module switch to ON.
   The marking system software will start automatically and display the Operator’s Main screen.

2. Place the system in Supervisor mode and configure or adjust the following.
   ♦ System Communication Parameters
   ♦ TMP4100,TMP4150: Adjust the system drive air pressure.
   ♦ TMP4150: Adjust the system return air pressure.
   ♦ TMP4150: Adjust the pin stroke
**Chapter 3**  
**System Communications**

### 3.1 REMOTE COMMUNICATIONS

The input/output control signals and the host communication capabilities of the marking system allow you to remotely control the marker. Using the I/O control signals you may start printing operations using a Programmable Logic Controller (PLC) or by connecting a simpler START PRINT contact closure. The host interface allows an RS-232 device to transmit data, select patterns for printing, and control the marker operation. Optionally, the host interface supports RS-485 communications for network applications.

#### 3.1.1 I/O Control Signals

TMC400 controllers are configured at the factory to operate with 12-to-24 VDC I/O signals. The I/O connector on the back panel of the controller provides access to the marking-cycle control circuit. If the customer chooses to use the I/O connector, you must ensure:

- the I/O signals are within the limits specified in Table 3-1
- shielded cabling is used
- cable shield is terminated (either to the DB15S connector at the controller or at the source, but not both)

The timing relationship of the three marking control signals (START PRINT, READY, and DONE) are illustrated in Figure 3-1.

![Input/Output Signals Timing Diagram](image)

**Figure 3-1. Input/Output Signals Timing Diagram**

READY and DONE are used to determine when the marker is available. The marker will acknowledge a START PRINT command only when READY and DONE are both high (on).

When the marker receives a START PRINT command, both READY and DONE go low (off).

DONE will go high after printing is complete. READY will go high after the marker returns to the Park position, provided all parameters to continue printing are within limits (e.g., serial number limits are not exceeded).

If the print cycle is aborted, DONE will go on, but READY will remain off.
### Table 3-1. Signals Limitations

<table>
<thead>
<tr>
<th>INPUT SIGNALS</th>
<th>LIMITS</th>
<th>OUTPUT SIGNALS</th>
<th>LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Input Voltage</td>
<td>11 VDC</td>
<td>Maximum Output Current</td>
<td>0.25 amps</td>
</tr>
<tr>
<td>Maximum Input Voltage</td>
<td>28 VDC</td>
<td>Maximum ON Resistance</td>
<td>0.50 ohms</td>
</tr>
<tr>
<td>Nominal Input Voltage</td>
<td>12 to 24 VDC</td>
<td>Maximum Line Voltage</td>
<td>40 VDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nominal Line Voltage</td>
<td>12 to 24 VDC</td>
</tr>
</tbody>
</table>

The I/O signals and their pin connections are described in Table 3-2.

### Table 3-2. I/O Connector Pin Assignments

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INPUT COMM</td>
<td>For all inputs (+ or – supply)</td>
</tr>
<tr>
<td>2</td>
<td>START PRINT</td>
<td>Input signal: Begins a print cycle</td>
</tr>
<tr>
<td>3</td>
<td>ABORT</td>
<td>Input signal: Aborts the print cycle</td>
</tr>
<tr>
<td>4</td>
<td>SEL_0</td>
<td>Input signal: Remote Pattern Selection</td>
</tr>
<tr>
<td>5</td>
<td>SEL_1</td>
<td>Input signal: Remote Pattern Selection</td>
</tr>
<tr>
<td>6</td>
<td>SEL_2</td>
<td>Input signal: Remote Pattern Selection</td>
</tr>
<tr>
<td>7</td>
<td>SEL_3</td>
<td>Input signal: Remote Pattern Selection</td>
</tr>
<tr>
<td>8</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>OUTPUT COMM</td>
<td>For all outputs (+ or – supply)</td>
</tr>
<tr>
<td>10</td>
<td>DONE</td>
<td>Output signal: Print cycle complete</td>
</tr>
<tr>
<td>11</td>
<td>READY</td>
<td>Output signal: Ready for message or Start Print signal</td>
</tr>
<tr>
<td>12</td>
<td>SPARE OUT</td>
<td>Spare output signal (for custom applications only)</td>
</tr>
<tr>
<td>13</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>not used</td>
<td></td>
</tr>
</tbody>
</table>
Figure 3-2 illustrates a simple contact closure for input signals using customer-supplied DC power.

![Figure 3-2. VDC Input Connections](image)

Figure 3-3 illustrates connections for output signals using customer-supplied DC power. To demonstrate differences in polarity, the graphic illustrates both sourcing outputs and sinking outputs.

![Figure 3-3. VDC Output Connections](image)
3.1.2 Remote Pattern Selection

The Remote Pattern Selection feature allows the system to monitor four dedicated input signals transmitted from a customer-supplied I/O device. These signals (SEL_3, SEL_2, SEL_1, and SEL_0) are received at the controller’s I/O connector.

The ON/OFF combinations of these four signals generate binary coded decimals (BCD) ranging from 0000 through 1111. Each value corresponds to a specific pattern name loaded in the TMC400 Controller. As the input signals are received, the firmware interprets their BCD value, then loads the corresponding pattern.

The reserved pattern names directly correspond with the fifteen (15) possible BCD values. To ensure proper pattern selection, the patterns stored in the controller that will be available for remote selection must be identified with specific pattern names. Refer to Table 3-3 for details.

### Table 3-3. Input Signal / Pattern Selection

<table>
<thead>
<tr>
<th>SEL_3</th>
<th>SEL_2</th>
<th>SEL_1</th>
<th>SEL_0</th>
<th>BCD</th>
<th>SELECTED PATTERN</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>0 0 0 0</td>
<td>(none - feature disabled)</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>0 0 0 1</td>
<td>PAT01</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>0 0 1 0</td>
<td>PAT02</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>0 0 1 1</td>
<td>PAT03</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>0 1 0 0</td>
<td>PAT04</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>0 1 0 1</td>
<td>PAT05</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>0 1 1 0</td>
<td>PAT06</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>0 1 1 1</td>
<td>PAT07</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>1 0 0 0</td>
<td>PAT08</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>1 0 0 1</td>
<td>PAT09</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>1 0 1 0</td>
<td>PAT10</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>1 0 1 1</td>
<td>PAT11</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>1 1 0 0</td>
<td>PAT12</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>1 1 0 1</td>
<td>PAT13</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>1 1 1 0</td>
<td>PAT14</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>1 1 1 1</td>
<td>PAT15</td>
</tr>
</tbody>
</table>

Notice that if all four input signals are OFF, the resulting BCD is 0000. This effectively disables the Remote Pattern Selection feature so the pattern may be loaded by the operator from the TMC400 Controller.
3.1.3 TTL I/O Control Signals
The TTL I/O connector on the back panel of the controller is provided for use with Telesis-supplied options such as a remote push-button station. If the customer chooses to use this connector, you must ensure:
- cabling to the contact closure does not exceed 6 feet (1.8 m).
- shielded cabling is used
- the shield is terminated to the DB9P connector at the controller only.

The TTL I/O signals and their pin connections are described in Table 3-4. Table 3-1 lists their electrical limitations. Figure 3-4 illustrates a simple contact closure for START PRINT and ABORT using the TTL I/O connector.

Table 3-4. TTL I/O Connector Pin Assignments

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>reserved</td>
<td>For Telesis Use Only</td>
</tr>
<tr>
<td>2</td>
<td>GND</td>
<td>System Digital Ground (common)</td>
</tr>
<tr>
<td>3</td>
<td>START PRINT</td>
<td>Input signal: Begins a print cycle</td>
</tr>
<tr>
<td>4</td>
<td>ABORT</td>
<td>Input signal: Aborts the print cycle</td>
</tr>
<tr>
<td>5</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>not used</td>
<td></td>
</tr>
</tbody>
</table>

![Figure 3-4. TTL I/O Connections](image)
3.2 HOST COMMUNICATIONS

The HOST connector on the back panel of the controller is capable of operating with either RS-232 or RS-485 devices. The hardware type (232 or 485) and the software protocol for the marking system must match the serial device with which it is communicating.

The RS-232 interface is most often used with remote devices such as host computers, terminals, or bar code scanners. The RS-232 interface may be used with either Extended Protocol or Programmable Protocol (described later in this chapter).

The RS-485 interface is normally used when communicating over long transmission distances or when several markers are networked. The RS-485 interface is required in multi-drop network applications. Additionally, Extended Protocol is required when using the RS-485 interface.

### Table 3-5. HOST Connector Pin Assignments

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>TXD</td>
<td>RS-232 data from controller</td>
</tr>
<tr>
<td>3</td>
<td>RXD</td>
<td>RS-232 data to controller</td>
</tr>
<tr>
<td>4</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>RS-232 Signal Return (ground)</td>
</tr>
<tr>
<td>8</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>X–</td>
<td>RS-485 bi-directional data – (internally jumpered to pin 12)</td>
</tr>
<tr>
<td>11</td>
<td>X+</td>
<td>RS-485 bi-directional data + (internally jumpered to pin 13)</td>
</tr>
<tr>
<td>12</td>
<td>X–</td>
<td>RS-485 bi-directional data –</td>
</tr>
<tr>
<td>13</td>
<td>X+</td>
<td>RS-485 bi-directional data +</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>If using RS-485 in a network, pins 14 and 15 must be jumpered on the last controller in the network drop for proper network termination.</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>(internally jumpered to pin 10 and to pin 12)</td>
</tr>
<tr>
<td>16</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>+5 VDC</td>
<td>Power for optional Bar Code Scanner</td>
</tr>
<tr>
<td>21</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>not used</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>not used</td>
<td></td>
</tr>
</tbody>
</table>
3.2.1 RS-232 Interface

The RS-232 interface is most often used with remote devices such as host computers, terminals, or bar code scanners. The RS-232 interface may be used with either Extended Protocol or Programmable Protocol (described later in this chapter).

If the customer chooses to use this connector, you must ensure:

- shielded cabling is used
- cable shield is terminated (either to the DB25S connector at the controller or at the host, but not both)
- the cable is wired according to Table 3-5 (using pins 2, 3, and 7 only)
- the cable is appropriately wired to connect to a DTE or DCE host (See Figure 3-5.)

![Figure 3-5. RS-232 Cable Diagrams](image)

The system supports XON/XOFF handshaking. When the system is unable to accept serial transmissions, it transmits the XOFF character. When the serial port is available, XON is transmitted. Similarly, if the serial port receives an XOFF signal while transmitting, the transmission is suspended until an XON is received.
3.2.2 RS-485 Interface

The RS-485 interface is normally used when communicating over long transmission distances or when several markers are networked. The RS-485 interface is required in multi-drop network applications. Additionally, Extended Protocol is required when using the RS-485 interface.

If the customer chooses to use this connector, you must ensure:

- shielded cabling is used
- cable shield is terminated (either to the DB25S connector at the controller or at the host, but not both)
- the cable is wired according to Table 3-5 (using pins 12, 13, 14, and 15 only)
- the multiple markers, if networked, are connected as shown in Figure 3-6

When multiple markers are used in a multi-drop network, each one must be assigned a unique Station ID number. The Station ID is used by the communications protocol to direct messages to a specific marker. Refer to the TMP4100-Series/400 Operator’s Manual for details.

In RS-485 installations where only one marker is used, it must be treated as the last one in the network and therefore must have pins 14 and 15 jumpered. The jumper places a 220 ohm terminating resistance across the X+ and X– signals.

![Figure 3-6. RS-485 Connections for Networked Markers](image-url)
3.2.3 Communication Parameters

The host communication parameters set for the marking system must match the parameters for the device or host with which it is communicating. The system parameters are set using the Setup command. Refer to the TMP4100-Series/400 Operator’s Manual for details. Table 3-6 lists the default settings and the available options.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>DEFAULT</th>
<th>OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud Rate</td>
<td>9600</td>
<td>1200, 2400, 4800, 9600, 19200</td>
</tr>
<tr>
<td>Parity</td>
<td>NONE</td>
<td>NONE, EVEN, ODD</td>
</tr>
<tr>
<td>Data Bits</td>
<td>8</td>
<td>7, 8</td>
</tr>
<tr>
<td>Stop Bits</td>
<td>1</td>
<td>1, 2</td>
</tr>
<tr>
<td>Type</td>
<td>RS-232</td>
<td>RS-232 or RS-485</td>
</tr>
<tr>
<td>Station ID</td>
<td>0</td>
<td>0 - 31</td>
</tr>
<tr>
<td>Protocol</td>
<td>EXTENDED</td>
<td>EXTENDED or PROGRAMMABLE</td>
</tr>
</tbody>
</table>

To provide the maximum flexibility, the system software supports both Extended Protocol and Programmable Protocol. Each protocol selection is described in the following paragraphs.
3.2.4 Programmable Protocol
Programmable Protocol is selected from the Setup Communications Screen. Programmable Protocol is used to communicate with devices where one-way communication is required (such as with bar code scanners). Programmable Protocol provides no error checking or acknowledgment of the transmitted data. The Programmable Protocol parameters define which characters to extract from the data transmission and how to employ them during the marking operation.

**NOTE**
The host message may contain ASCII characters that define the Start, Terminating, and Ignore characters within the transmitted data. To identify these ASCII characters, you must specify their decimal equivalents when setting up the following parameters. (Refer to the ASCII Cross Reference Table provided in the TMP4100-Series/400 Operator’s Manual.)

**Start Character**
(optional) Identifies the ASCII character in the host message where the marking system should begin to count character positions.

**Terminator Character**
Identifies the character in the host message that represents the end of the transmitted string. The terminating character is usually the ASCII carriage return (CR) character (decimal 13).

**Character Position**
Identifies the character position in the data string where the marking system will begin to extract data from the host message.

**Character Length**
(optional if Terminator Character is used) Identifies how many characters to extract from the host message. The Position parameter and Length parameter work together to extract characters from the host message.

**Ignore Character**
Identifies the character in the host message that the marking system should ignore. For example, ASCII Line Feed (LF) character (decimal 10).

**Message Type**
Enables message-type recognition for Programmable Protocol which defines how the marking system is to use the data it receives from the host. Programmable Protocol recognizes P, V, and 1 message types.

**Message Type P** supplies the pattern name to be loaded.

**Message Type V** updates a specific field with the data supplied by the host. The field must contain a variable text flag (%#V).

**Message Type 1** overwrites a specific field with the data supplied by the host. Note that if the field contains message flags, they will be overwritten with data and can not be updated unless the pattern is reloaded.

Message Types V and 1 use the format: \textbf{Vnn<string>} or \textbf{1nn<string>}
where nn represents the field number where you want to place the data. Note that fields 01 through 09 require a leading zero as a place holder.
3.2.5 Extended Protocol

Extended Protocol is selected from the Setup Communications Screen. Extended Protocol is designed to provide secure communications with an intelligent host device. It communicates with such devices using pre-defined message formats, response formats and message types. It also provides hand-shaking to detect faults in the transmitted messages, effectively verifying that the data is properly received. Refer to the TMP4100-Series/400 Operator's Manual for details.

Additionally, Extended Protocol communications are fully compatible with other Telesis Marking System products. It allows for multi-drop communications so that the markers may be networked. All communications are carried out in a MASTER/SLAVE relationship, with the host being the master. Only the host (master) has the ability to initiate communications. The slave communicates only in response.

The following paragraphs discuss the message and response formats, the message types, and the Block Check Code (BCC) calculations.

MESSAGE FORMAT

This is the format of messages from the host computer to the Telesis equipment.

| SOH  | TYPE | [##] | STX | [DATA TEXT] | ETX | [BCC] | CR |

where:

SOH  ASCII Start of Header character (001H). The marking system ignores all characters received prior to the SOH.

TYPE  A single printable ASCII character that defines the meaning and the contents (the type) of the current message. Message types are defined later in this section.

[##]  Two, optional, ASCII decimal digits that specify the Station ID number. If only one marker is used, the ID field may be eliminated and “00” will be assumed. For multi-drop network applications that use more than one marker, the Station ID identifies the individual markers. For multiple-marker applications, the ID may range from 01 to 31.

STX  ASCII Start of Text character (002H).

[DATA TEXT]  An optional field that may be required for certain message types. This field contains message data.

ETX  ASCII End of Text character (003H).

[BCC]  A Block Check Code (BCC) generated and sent to improve link reliability by providing fault detection. The BCC is calculated by taking an eight bit addition of the TYPE and DATA TEXT characters and transmitting them as a three digit ASCII decimal number in the range from 000 to 255. If the sum is greater than 255, the most significant bit overflows and is discarded. Refer to the example calculation later in this section.

If the host system is incapable of generating the BCC, it may be omitted at the risk of undetected transmission errors.

CR  ASCII Carriage Return character (00DH).
RESPONSE FORMAT
The following defines the message returned by the marking system in response to a message sent from the host computer. The marker will respond in one of two ways.

If the host transmission is error free, the marking system responds with an acknowledge message in the format:

```
SOH  TYPE  [##]  ACK  STX  [DATA TEXT]  ETX  BCC  CR
```

If an error is encountered, the marking system responds with a negative-acknowledge message in the format:

```
SOH  TYPE  [##]  NAK  STX  [DATA TEXT]  ETX  BCC  CR
```

where:

SOH  ASCII Start of Header character (001H).

TYPE  The TYPE returned is the same type as sent by the host computer.

[##]  The Station ID number of the responding marker. The ID should match the ID of the host message. If the Station ID is “00”, it is not sent.

ACK  ASCII Acknowledge character (006H). Sent if the message was received in the correct format with no errors.

NAK  ASCII Negative-Acknowledge character (015H). Sent if the message was received with an error.

STX  ASCII Start of Text character (002H).

[DATA TEXT]  An optional field that may be required for certain message types. This field contains the actual data of the message.

ETX  ASCII End of Text character (003H).

BCC  A Block Check Code generated and sent to improve link reliability by providing fault detection. The BCC is calculated by taking an eight bit addition of the TYPE and DATA TEXT characters and transmitting them as a three digit ASCII decimal number in the range from 000 to 255. If the sum is greater than 255, the most significant bit overflows and is discarded. Refer to the example calculation later in this section.

CR  ASCII Carriage Return character (00DH).

If the host computer does not receive a response from the Telesis equipment within three seconds, the host computer should transmit the original message again. If no response is received after three tries, the host computer should abort the sequence and declare the link to be down.
MESSAGE TYPES

The following data types are currently recognized by the marking system for Extended Protocol:

Type 1  The data field contains text that will overwrite data in a specific field of the currently loaded pattern. The first two characters of the data field must contain the field number to which the data is directed. The field numbers start at 01 and range up to the last field in the pattern. Note that a leading zero is required for fields 01 through 09. (This message type may also be used with Programmable Protocol.)

Type V  The data field contains text that will update data in a specific field of the currently loaded pattern. The specified field must contain a variable text flag (%#V). The first two characters of the data field must contain the field number to which the data is directed. The field numbers start at 01 and range up to the last field in the pattern. Note that a leading zero is required for fields 01 through 09. (This message type may also be used with Programmable Protocol.)

Type P  The data field contains the name of an existing pattern to be loaded for printing. (This message type may also be used with Programmable Protocol.)

Type O  This message will place the marker ONLINE and have it seek home. This will allow a host computer to recover from a power outage when the marker is unattended.

Type G  This message has no data field text. It simply initiates a print cycle - “GO”.

Type I  This message type requests the output status of the marker. The marker will return a single digit hexadecimal value to report the state of the READY and DONE signals. The system will return 0, 1, 2, or 3 depending on the following signal states:

0 = READY off  DONE off  (both off)
1 = READY on   DONE off
2 = READY off  DONE on
3 = READY on   DONE on  (both on)
EXAMPLE BCC CALCULATION
The following example is an example of a typical transmission, including the Block Check Code calculation.

To download the character string “ABC123” to be marked in the first field on the next item, you must wait until the current marking cycle is complete. Text must be downloaded when the machine is idle. Once the marker is idle, the host sends the following message (note that all data shown is Hexadecimal):

```
SOH  1  STX  01ABC123  ETX  238  CR
```

where:
1. ‘1’ indicates that this message contains text to print
2. ‘01’ in front of the text specifies field number 1
3. ‘238’ is the BCC. The BCC is calculated as follows:

1. BCC = Message type character + data text characters (as follows).
   - 031H (1) = message type
   - 030H (0) = first digit of field number
   - 031H (1) = second digit of field number
   - 041H (A)
   - 042H (B)
   - 043H (C)
   - 031H (1)
   - 032H (2)
   + 033H (3)
   \[ 1EEH \]

2. The system is only interested in the lower eight bits, so it discards the first digit of the sum and keeps the lower two, resulting in a BCC of EEH. It then converts the hexadecimal value to decimal:
   \[ EEH = 238 \text{ decimal} \]

3. The decimal value is then converted into its equivalent ASCII representation (where 2 = 032H, 3 = 033H, and 8 = 038H). This is the transmitted BCC. The actual data transmitted (in hex) by the Host for the entire message is:
   - 001H 031H 002H 030H 031H 041H 042H 043H
   - 031H 032H 033H 003H 032H 033H 038H 00DH

4. The marking system will respond with a transmission of:
   - 001H 031H 006H 002H 003H 030H 034H 039H 00DH
   which equates to the following ASCII message:

```
SOH  1  ACK  STX  ETX  049  CR
```

NOTE: If the system detected an error in receiving the message from the host, it would respond with a NAK (015H) character in place of the ACK. The BCC would be unaffected by this since the ACK/NAK character is not included in the BCC calculation.
Chapter 4
Reference Data

4.1 SYSTEM DRAWINGS
This section contains drawings that document the TMP4100-Series/400 Marking Systems installation. Refer to these drawings when installing the system.

<table>
<thead>
<tr>
<th>FIGURE NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-1</td>
<td>TMP4100-Series/400 System Diagram</td>
</tr>
<tr>
<td>4-2</td>
<td>TMP4150 Mounting Details</td>
</tr>
<tr>
<td>4-3</td>
<td>TMC400 Controller Installation</td>
</tr>
</tbody>
</table>

4.2 PARTS LISTS
Refer to the TMP4100-Series/400 Operator’s Manual for a list of the marking system components. The manual also lists the available impact pins and pin cartridge assemblies that can be used with the marking head.

If you need parts for the marking system, be sure to specify the model number and serial number of your marking head when ordering. Contact Telesis Customer Support at:

Telesis Technologies, Incorporated
28181 River Drive
Circleville, Ohio 43113
PHONE (800) 654-5696 (U.S. and Canada)
(740) 477-5000
FAX (740) 477-5001
This page intentionally left blank.
Figure 4.1. TMP4100-Series/400 System Diagram
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Figure 4-2. TMP4150 Mounting Details
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*** WARNING ***
Do not remove feet. Internal damage will result. Consult factory for details.

CAUTION
This envelope provides minimum clearance for cable connections and airflow. It does not guarantee adequate cooling.

If controller is enclosed, ensure ambient temperature does not exceed acceptable level. Do not block fan or vents in the controller's case.

Figure 4-3. TMC400 Controller Installation
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